Supreme Court, U. S.
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IN THE

Supreme Court of the United States

October Term, 1976

No. 76-219

INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION,

Petitioner,

v.

RAYCHEM CORPORATION,

Respondent.

PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIRST CIRCUIT

DANA M. RAYMOND
30 Rockefeller Plaza
New York, New York 10020

JOHN R. HALLY
75 Federal Street
Boston, Massachusetts 02110
Attorneys for Petitioners

August 13, 1976

Of Counsel:
ROBERT NEUNER
BRUMBAUGH, GRAVES,
DONOHUE & RAYMOND
30 Rockefeller Plaza
New York, New York 10020

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International Telephone and Telegraph Corporation (ITT) prays that a writ of certiorari issue to review the judgment and opinion of the United States Court of Appeals for the First Circuit entered in this case on June 25, 1976.

Opinions Below

The opinion and judgment of the Court of Appeals for the First Circuit, dated June 25, 1976, are not yet reported officially. They appear in Appendix A to this Petition at A-1 to A-15 and A-16, respectively.

The memorandum and order of the District Court are reported at F. Supp. (1975), 188 USPQ 214, and are reproduced in Appendix B to this Petition at B-1 to B-20.

Jurisdiction

The judgment of the Court of Appeals (A-16) was entered on June 25, 1976. The jurisdiction of this Court is conferred by 28 U. S. C. § 1254(1).

Questions Presented

1. Whether a combination patent may be sustained on a finding of sufficient synergistic effect without regard to whether the claimed combination was obvious to those skilled in the art or came naturally, without invention, from the exercise of ordinary skill in the art and whether the decision by the court below was in conformity with the principles enunciated by this Court in *Sakraida.*[1]

2. Whether the statutory provision that a patent shall set forth the best mode contemplated by the inventor of carrying out his invention is violated when the patent does not set forth the mode of carrying out the invention that the patentee is employing in production and for commercial sales (35 U. S. C. § 112).

Statutes Involved

Section 103 of the Patent Act, 35 U. S. C. § 103, provides that:

> "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made."

Section 112 of the Patent Act, 35 U. S. C. § 112, provides in pertinent part:

> "The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention."

[1] *Sakraida* v. *Ag Pro, Inc.*, —— U. S. ——, 96 S. Ct. 1532 (1976), *pet. for reh. den.*, 44 U. S. L. W. 3738 (June 21, 1976).

Statement

Proceedings Below

This case involves a patent for insulation used on wire that consists simply of two different plastic materials arranged one on top of the other. The patent is U. S. patent No. 3,269,862 entitled "Crosslinked Polyvinylidene Fluoride Over a Crosslinked Polyolefin" and was issued on August 30, 1966, in the names of Vincent L. Lanza and Edward C. Stivers ("Lanza patent").

On December 10, 1971, ITT instituted a declaratory judgment action against the Raychem Corporation (Raychem), assignee of the Lanza patent, seeking an adjudication of invalidity and non-infringement of the Lanza patent. Raychem counterclaimed for patent infringement. Federal jurisdiction is conferred on the District Court by 28 U. S. C. § 1338(a) and 28 U. S. C. § 2201.

The case was tried in the summer of 1974, and the District Court handed down its decision on July 29, 1975 (B-1). In its decision, the District Court held that the Lanza patent was valid and infringed. An appeal by ITT followed, and on June 25, 1976, the Court of Appeals for the First Circuit affirmed the decision of the District Court (A-1).

The Lanza Patent

As stated by the District Court, the invention of the Lanza patent is simplicity itself. It is wire insulation comprised of a combination of two plastic materials, both of which were commercially available and not invented by Raychem, and the use of those materials in their crosslinked state (B-7, 8). The plastics are polyethylene and polyvinylidene fluoride (referred

to by the courts below and here by its trade name, Kynar). Polyethylene, long known and used as an insulation material because of its superior electrical properties, constituted the inner layer, and the Kynar constituted the outer layer or jacket.

The Lanza patent sets forth examples of wire insulation, with polyethylene and Kynar layers, which purport to be working embodiments of the patented wire (A-12). The Lanza patent did not disclose the actual compositions of the polyethylene and Kynar layers that Raychem was using in commercial production before and at the time of filing (October 22, 1964) for the Lanza patent (A-12, A-5), and the compositions disclosed in the Lanza patent have never been used by Raychem in commercial production.

The claims of the Lanza patent broadly monopolize the use of crosslinked Kynar as a jacket over polyethylene and other polyolefins and are not directed to or confined to the use of such wire insulation in high performance aircraft or to any other specific end use (A-13).[2] They are not limited to any specific wall thickness or range of wall thicknesses for the Kynar and polyethylene layers. Nor are they limited to any specific selection among the many forms of polyolefin and Kynar that are available or to any specific treatment of such materials. The patent claims do not call for any kind or degree of flame resistance, temperature rating, weight, or size for the wire insulation or any other property of the wire insulation.

The Opinion of the Court of Appeals in Relation to the First Question

The Court of Appeals acknowledged that the use of different insulation materials in two-layer constructions in order to secure the benefit of the properties of both materials in a composite insulation was a practice known from the 1930's (A-8). The

[2] Claim 1 of the Lanza patent reads as follows:

"1. An insulating material comprising a first layer comprising a crosslinked polyolefin and a second layer comprising crosslinked polyvinylidene fluoride, each of said layers being crosslinked throughout."

Court of Appeals also noted, as the District Court had not, that it was well-known in the trade that the properties of polyethylene insulation could be improved by placing a protective layer or jacket over the polyethylene (A-4).

As to the use of Kynar for wire insulation, the Court of Appeals noted, as the District Court had not, that a 1962 new product brochure, distributed by the manufacturer of Kynar, stated that Kynar had several desirable qualities for secondary wire insulation, including toughness, heat stability and flame resistance (A-9). The brochure indicated also, again as observed by the Court of Appeals, that Kynar had use "for extruded jackets and prime insulation for high temperature wire insulation" (A-9). Finally, the Court of Appeals noted that it was in the prior art that Kynar could be crosslinked to provide superior performance as a wire insulation (A-10).

Thus, the Court of Appeals acknowledged the salient facts concerning the state of the art which demonstrated that the selection of crosslinked Kynar as a jacket for crosslinked polyethylene was a state of the art use of a new insulation material that had recently come on the market; the work of the skilled artisan and not an inventor. However, the Court of Appeals declined to rule on whether the District Court had erred in failing to consider such facts on the issue of obviousness and declined to make the inquiry that had not been made by the District Court and to determine whether such use of Kynar, as broadly claimed in the Lanza patent without any limitations on uses or properties of the insulation, was obvious as a matter of law in view of such acknowledged facts. Instead, the Court of Appeals inquired whether any of the factual findings that the District Court had made were clearly erroneous. Concluding that there was some evidence in support of such findings, the Court of Appeals ruled that the Lanza patent was valid on the basis of findings by the District Court which were held to "establish a sufficient 'synergistic' effect between the materials in the new combination, to cross the legal border line from a combination which produces a 'more striking result' to one which constitutes a patentable invention" [citing *Sakraida*] (A-7).

Our point before the Court of Appeals, and reasserted in this Petition, was and is that such alleged synergistic results are immaterial on the issue of obviousness. If it was obvious to test and use the newly available Kynar as a jacket for wire insulation, with its outstanding properties of toughness, flame resistance and thermal stability, it was no less obvious because the result was to impart advantages of the very kind that were to be expected, but at a level which were found to be surprising or synergistic.

The findings upon which the Court of Appeals based its holding of patentability were that the wire insulation of the Lanza patent had an "unpredictably high" temperature rating and was "unexpectedly flame resistant" (A-7).[3]

This was the "sufficient synergistic effect" upon which the Court of Appeals rested its decision. But such synergistic effect does not in any way negate the obviousness of using crosslinked Kynar with its outstanding properties of flame resistance and thermal stability as a protective jacket over polyethylene in order to enhance the flame resistance and thermal properties of the insulation. As was said in *Zero Manufacturing Co.* v. *Mississippi Milk Pro. Ass'n*, 358 F. 2d 853 (5th Cir. 1966) *cert. den.*, 385 U.S. 841 (1966), at page 855:

> "It is axiomatic that a patent should not be granted for the discovery of a result that would flow naturally from the teachings of the prior art. To do nothing more than combine the teachings available in a manner which would have been obvious to one skilled in the art, even though the device has unexpected advantages, does not create a patentably new invention."
>
> Accord, *General Tire & Rubber Co.* v. *Jefferson Chemical Co.*, 497 F. 2d 1283, 1291 (2nd Cir. 1974), *cert. den.*, 419 U.S. 968.

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[3] The Lanza patent did not disclose or suggest such synergistic effects, and reliance by the Court of Appeals upon undisclosed effects of any kind was in conflict with *Carter-Wallace, Inc.* v. *Otte*, 474 F. 2d 529, 548-9, (2nd Cir. 1972), *cert. den.*, 412 U.S. 929 (1973).

The Opinion of the Court of Appeals in Relation to the Second Question

The insulated wire of the Lanza patent was developed for use in the F-111 fighter plane (A-3). During the course of its development program in early 1964, Raychem developed proprietary compound formulations which included certain copolymers for the polyethylene layer and a Compound X for the Kynar layer (A-12). These formulations composed the Raychem insulated wire that was tested, qualified for military use and sold commercially several months before the filing date of the Lanza patent (October 22, 1964) (A-12, A-5), and represented Raychem's best thinking and experience on how to secure the profitable production of crosslinked Kynar-crosslinked polyethylene insulated wire (A-13).

The Lanza patent does not contain a disclosure of these formulations. In disposing of this lack of disclosure in the Lanza patent, the Court of Appeals held that the requirement of 35 U. S. C. § 112, that an inventor disclose in his patent specification the "best mode" contemplated by him for carrying out his invention, was satisfied when a patentee had disclosed only so much about the invention as would enable those skilled in the art to make and use the claimed invention. The statutory provision with respect to best mode was, in effect, read out of the statute by the Court of Appeals.

The error of the Court of Appeals arose from its failure to distinguish and separate the best mode requirement in 35 U. S. C. § 112 from the independent and separately stated provision in the statute that a patent shall also disclose the invention in such clear and exact terms as to enable a person skilled in the art to make and use the invention, called an enabling disclosure. Here, the requirement for the enabling disclosure was simplicity itself, calling only for a description of placing crosslinked Kynar in any formulation over crosslinked polyethylene in any formulation, as in the examples of the Lanza patent. The "best mode" requirement, however, is for something more. It calls for nothing less than complete disclosure by an inventor who seeks the privilege of a patent of all that is known to him in carrying out his

invention that will aid in the convenience of manufacture and in optimizing the advantages that may be secured from his invention. The public is to be informed of all that the inventor knows about how to get the maximum benefit from his invention. Raychem knew and was using specially selected formulations for the polyethylene and Kynar which provided increased efficiency and economy in the production of the insulation. Such knowledge and formulations constituted the best mode contemplated by Raychem of carrying out the invention and were not disclosed in the Lanza patent.

Reasons for Granting the Writ

The questions raised in this petition are of public importance because they relate to fundamental standards of patent validity that must frequently be applied by the courts and the bar, and as to which clarification is required.

The Court of Appeals has declared a patent to be valid on the basis of a legal standard which is in conflict with the decisions of this Court in *Graham* v. *John Deere Co.*, 383 U.S. 1 (1966) and *Sinclair Company* v. *Interchemical Corp.*, 325 U.S. 327 (1945). Relying upon the more recent decision by this Court in *Sakraida* v. *Ag Pro, Inc. supra*, 96 S. Ct. 1532, the Court of Appeals held that "a sufficient synergistic effect" established patentability as a matter of law in a combination (1) which was obvious in accordance with the standard of *Graham* and (2) which was unpatentable as being an old combination containing a newly available material with known and improved properties, in accordance with *Sinclair*. The decision of the Court of Appeals raises the question whether *Sakraida* has resulted in a new standard of patentability for combination patents that was not foreshadowed by the earlier decisions of this Court.

The Court of Appeals has interpreted the provision in 35 U. S. C. § 112 that a patent "shall set forth the best mode contemplated by the inventor of carrying out his invention" as not requiring that the patent disclose the composition of the patented product as actually manufactured by the patentee for commercial sale. This Court has not heretofore considered the scope of the best mode requirement in 35 U. S. C. § 112 and the decision by the Court of Appeals to the effect that the best mode requirement is a nullity strongly suggests that review of this matter by this Court is timely.

1. The Decision by the Court of Appeals that the Lanza Patent is Valid by Reason of a Sufficient Synergistic Effect is not in Conformity with the Principles of *Sakraida* and is in Conflict With Earlier Decisions of this Court

The Court of Appeals has interpreted *Sakraida* as providing that a patent for a combination may be sustained solely on the basis that the combination produces a sufficient synergistic effect. As an exclusive and affirmative criterion for sustaining the validity of combination patents, such a standard based on the assessment of synergistic results is in conflict, literally and in substance, with the standard of patentability based on non-obviousness as set forth in 35 U. S. C. § 103. The statutory standard of non-obviousness is that an "invention", including a combination of old elements with synergistic or striking effects, will not be patentable if the differences between the prior art and the subject matter sought to be patented are such that the subject matter sought to be patented would have been obvious to those skilled in the art. It is significant that the standard of obviousness is applicable to the "subject matter sought to be patented" and not to asserted synergistic effects which cannot be patented and, in this case, were not sought to be patented.

That is the law as it was actually applied in *Sakraida*, but the Court of Appeals has interpreted *Sakraida* differently. In *Sakraida*, a patent on a flush system for delivering water directly to a barn floor was held invalid for obviousness to those skilled in the art despite "a more striking result than in previous combinations," *supra*, 96 S. Ct. at 1537. In the case at bar, a patent has been held valid on the basis of a "sufficient synergistic effect", despite facts acknowledged by the Court of Appeals demonstrating that the claimed combination of insulation comprised of crosslinked Kynar over crosslinked polyethylene was obvious to

those skilled in the art and, indeed, was only a state-of-the-art construction of an old two-layer combination, employing the newly available material, Kynar.

The "sufficient synergistic effect" found by the Court of Appeals cannot rationally or in principle be distinguished from the "more striking result" in *Sakraida* which was held not to be a basis for patentability of a combination of old elements that was obvious to those skilled in the art. On the authority of *Sakraida,* the Lanza patent should have been held invalid.

The case at bar well illustrates that the inquiry into obviousness for combination patents, as set forth in 35 U. S. C. § 103, ought not to be translated to an inquiry into the quantum or level of synergistic effects as was done by the Court of Appeals. The suppliers and users of new materials that are constantly being introduced to the market ought not to be restricted in their sales and use of such materials by patents that have issued to those who claim to have encountered a synergistic effect when using such materials for purposes and in combinations that are known and obvious to those skilled in the art.

In accord with the Patent Act and the authorities, the ultimate issue as to patentability in this case that should have been inquired into and judicially determined as a matter of law by each of the courts below but was not, is whether it was obvious to wire insulation manufacturers to employ crosslinked Kynar with its known properties of flame resistance, toughness and thermal stability to perform the well-known functions of a jacket over crosslinked polyethylene. The extensive attention in the opinions below to surprising or synergistic effects and to coping with the special requirements of insulation for high performance aircraft, none of which is disclosed or claimed in the Lanza patent, did not constitute the inquiry into obviousness of the subject matter sought to be patented that is called for by 35 U. S. C. §103.

Moreover, it has been settled law that the substitution of a new material with known properties in an old combination does not constitute invention. The rationale of such cases has been that such substitution of a new material with known properties

is an expected and natural development in the technological arts, the normal work of those who are skilled in such arts, and ought not to be the basis for a patent monopoly on such use of the new material or on the old combination when including the new material.

In the leading case, *Hotchkiss* v. *Greenwood,* 11 How. 248 (1850), a patent on the substitution of porcelain for wood and metal in a door knob was held to be invalid, the opinion stating that such substitution was

> ". . . formal, and destitute of ingenuity or invention. It may afford evidence of judgment and skill in the selection and adaptation of the materials in the manufacture of the instrument for the purpose intended, but nothing more." Id. at 266.

In *Sinclair Co.* v. *Interchemical Corp., supra,* 325 U.S., 327, the Court reviewed the factual and legal considerations that are involved in the substitution of a new material in an old combination. The patent there in suit was for a printing ink which would not dry at ordinary temperatures, but would dry instantly upon the application of heat to the printed paper. Those characteristics of the ink and the substantially improved results that had been obtained by the patentee depended upon the solvent, butyl carbitol, that had been selected by the patentee. Three years before the patentee developed the ink, butyl carbitol had been placed on the market, and the properties of butyl carbitol that indicated its suitability as a solvent were listed in the catalogue of Carbide & Carbon Chemicals Corporation. There were earlier patents for ink that would dry quickly when subjected to heat, but they disclosed solvents other than butyl carbitol. In holding the patent invalid, the Court stated:

> "Gessler's solvent is undoubtedly more satisfactory than any of the solvents mentioned in these patents, but it must be remembered that all but one of these patents were granted before butyl carbitol appeared on the market . . . Even assuming that if Gessler had discovered the compound he would be entitled to a patent, he did not discover it. Reading a list and selecting a known com-

> pound to meet known requirements is no more ingenious than selecting the last piece to put into the last opening in a jig-saw puzzle. It is not invention." Id. at 334-335.

Relying on principles enunciated in *Sakraida*, the Court of Appeals has sustained a combination patent on the basis of a sufficient synergistic effect without making the judicial determination of non-obviousness of the claimed combination that is called for by Section 103 of the Patent Act and *Graham, supra,* 383 U.S. at 17, and without reference to the principle of lack of invention in the substitution of a new material with known properties in an old combination, as in *Sinclair*.

Heretofore, as in *Anderson's-Black Rock* v. *Pavement Co.*, 396 U.S. 57 (1969), this Court has referred to synergism in connection with a combination patent in the context that a lack of synergistic effect is an indication of lack of invention in the combination sought to be patented and thus of non-patentability. This Court has not stated that a combination patent may be sustained upon a finding of sufficient synergistic effect and without regard to whether the claimed combination that happens to produce such synergistic effect would have been obvious to those skilled in the art or came naturally, without invention, from the work of those who were exercising ordinary skill in the art. However, that is the construction that has been placed on *Sakraida* by the Court of Appeals. Review by this Court is necessary in order to resolve the uncertainties that have arisen with respect to the legal standard of patentability for combinations of old elements.

2. The Court of Appeals has Decided that the Lanza Patent is Valid Despite Its Failure to Disclose the Commercial Form of the Patented Combination and This Decision is in Conflict With the "Best Mode" Provision of the Patent Act and the Decisions of Other Federal Courts

In sustaining the Lanza patent, when the patent was intentionally drafted so as not to disclose the form of the patented

combination which the patentee had put into commercial production, the Court of Appeals failed to follow one of the statutory requirements relating to what is to be disclosed in a patent. The Court's decision is in conflict with the decisions of other federal courts to the effect that the statutory requirement (35 U. S. C. § 112) that the patent ". . . shall set forth the best mode contemplated by the inventor of carrying out his invention" is a substantive requirement that is to be complied with forthrightly and without reservation if a valid patent is to issue.

Thus, in *Stelos Co.* v. *Hosiery Motor-Mend Corporation*, 60 F. 2d 1009, 1011 (S.D.N.Y. 1932), the nature and scope of the patentee's obligation was stated as follows:

> ". . . as Baron Alderson said in Morgan v. Seaward 1 Web. 170, at 174: 'If a patentee is acquainted with any particular mode by which his invention may be most conveniently carried into effect he ought to state it in his specifications.' "
>
> * * *
>
> "The public is entitled to all the knowledge which the inventor has in regard to his invention, and if a process can be achieved both by an expensive and a cheap element, the patentee must disclose the cheap element as well as the expensive element so that the public may have the same advantage after his monopoly ceases as the patentee had during the monopoly period. Turner v. Winter, 1 Web. 77, 81; Wood v. Zimmer, 1 Web. 82; Savory v. Price, 1 Web. 83; Sturtz v. De la Rue, 1 Web. 83."

In *Flick-Reedy Corp.* v. *Hydro-Line Manufacturing Co.*, 351 F. 2d 546, 551 (7th Cir. 1965), the Court of Appeals for the Seventh Circuit, in affirming a holding of invalidity where the patentee had elected to withhold specific information in connection with his invention as a trade secret, stated

> "To accept the monopoly and withhold the full disclosure of the 'best mode contemplated by the inventor,' which will result in a contribution to the common good upon

> expiration of the monopoly is the 'selfish desire' against which 35 U. S. C. §112 is directed. Application of Nelson, 280 F. 2d 172, 184 (CCPA 1960)."

In the case at bar, a broad patent monopoly on the combined use of two important and well-known categories of plastic materials has been granted and sustained. Yet, the specific formulation of the patented combination which the patentee had developed for commercial production and found to be commercially profitable has been withheld from public disclosure and may never be disclosed. It would be difficult to conceive of a clearer violation of the patentee's statutory obligation to set forth in his patent the best mode known to him for carrying out his invention.

The disclosure provisions in the Patent Act are fundamental to the patent system. In return for the patent grant and the right to exclude others from practice of the invention for 17 years, a patent is to contain a complete disclosure of the invention, including the best mode known to the inventor for putting his invention into use, in order that such knowledge, becoming public with the grant of the patent, may aid in the advance of the technological arts during the lifetime of the patent and so that such knowledge will be in the public domain upon the expiration of the patent. If the patent disclosure is defective and incomplete, then the public interest in the grant of the patent has been defeated and the patent is invalid. The decision by the court below raises a substantial question as to whether a patentee, who has deliberately refrained from disclosing how his invention has been formulated and adapted for commercial practice, has complied with the letter and purpose of the Patent Act.

Conclusion

The decision by the Court of Appeals raises substantial questions that are of public importance in the administration of the patent law. It is respectfully urged that this Petition for Writ of Certiorari be granted.

Respectfully submitted,

DANA M. RAYMOND
30 Rockefeller Plaza
New York, New York 10020

JOHN R. HALLY
75 Federal Street
Boston, Massachusetts 02110

August 13, 1976

Of Counsel:

ROBERT NEUNER
BRUMBAUGH, GRAVES,
DONOHUE & RAYMOND
30 Rockefeller Plaza
New York, New York 10020

APPENDIX A

UNITED STATES COURT OF APPEALS

FOR THE FIRST CIRCUIT

No. 75-1373

INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION,
Plaintiff-Appellant,

v.

RAYCHEM CORPORATION,
Defendant-Appellee.

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF MASSACHUSETTS

[HON. JOSEPH L. TAURO, *U. S. District Judge*]

Before COFFIN, *Chief Judge,*

McENTEE and CAMPBELL, *Circuit Judges.*

Dana M. Raymond, with whom *Robert Neuner, Brumbaugh, Graves, Donohue & Raymond, John R. Hally*, and *Nutter, McClennen & Fish* were on brief, for appellant.

James W. Geriak, with whom *Douglas E. Olson, Thomas D. Kiley, Lyon & Lyon, William Hulbert*, and *Fish & Richardson* were on brief, for appellee.

June 25, 1976

COFFIN, *Chief Judge.* Plaintiff-appellant International Telephone and Telegraph Corporation (ITT) filed this declaratory judgment action for an adjudication of invalidity and noninfringement of U. S. Patent No. 3,269,862, entitled "Crosslinked Polyvinylidene Fluoride over a Crosslinked Polyolefin", issued on August 30, 1966 in the names of Vincent K. Lanza and Ed-

ward C. Stivers (Lanza Patent). Defendant Raychem Corporation (Raychem), assignee of the Lanza Patent, counterclaimed for infringement. After a bench trial, the district court found the patent to be valid and infringed by ITT.

On appeal, ITT claims that the district court erred as a matter of law upon the issue of obviousness under 35 U. S. C. § 103, and that it made clearly erroneous findings of fact bearing upon that issue. Further, it challenges the court's determination that the patent complied with the "best mode" disclosure requirement under 35 U. S. C. § 112. The final issue is whether the district court erred in finding that the patentees had not committed fraud by failing to disclose information to the Patent Office.

The patent in suit describes a wire insulation composed of a primary layer of a crosslinked polyelefin, such as crosslinked polyethylene, and a secondary, outer layer of crosslinked polyvinylidene fluoride (referred to hereinafter by its trade name, Kynar).[1] The wire insulation claimed in the patent may contain antimony oxide in the polyethylene layer. Wire constructed within the claims of the patent is particularly suitable for use on high performance jet aircraft to carry electricity to various

[1] Some technical terms must be defined:

A polymer is a chemical compound, or mixture of chemical compounds, which consists essentially of repeated structural units. The individual units are called "monomers". Polyethylene, for example, is a chain of successive ethylene, CH_2, units. Polyvinylidene fluoride is a chain of vinylidene fluoride, CF_2-CH_2, units.

Polyolefin is a generic term for polymers made from certain types of organic compounds—hydrocarbon chemicals. Polyethylene is a polyolefin.

Crosslinkages between individual polymeric chains impart greater form stability to the plastic. Crosslinkages are created by bombarding the plastic with electrons, subjecting it to irradiation, or, with some materials, vulcanizing it.

Thus, crosslinked polyolefins are a group of polymers of certain hydrocarbons which have been processed to achieve greater form stability.

parts of the airplane, and to transmit electronic signals for the extensive electronic equipment used on the plane. This wire has been qualified for Defense Department aircraft under Military Specification Mil-W-81044. Accordingly, it is referred to in the trade as 44 wire.

Military specifications are prepared by the government in consultation with the contractors who build the aircraft. The specifications sets forth a number of performance characteristics in addition to electrical insulation. A wire must satisfy each of the performance standards before it can be used pursuant to the specification. The characteristics needed for aircraft wire include: (1) low flammability; (2) solvent resistance (so that gas leaks will not degrade the wire); (3) abrasion resistance; (4) flexibility; (5) processability (capacity of a wire to be stripped, marked or sealed); and (6) notch insensitivity (capacity of a wire to be nicked and bent without cutting through the entire depth of insulation). Two other characteristics are of particular importance to this case: low weight and a specified "temperature rating", i.e., the highest temperature at which a wire has a useful service life of 10,000 hours. For each of the foregoing characteristics, tests have been devised which indicate the wire's standard of performance. A military specification will list the standards of performance necessary to qualify a wire under it.

The wire described in the patent in suit was developed for use in the F-111 fighter plane. General Dynamics, the contractor in charge of the Air Force version of that plane, initiated a search for a light weight, medium temperature rated aircraft wire. In response, Raychem began experimentation with a number of possible wire constructions. The types of constructions it attempted, however, were limited by the technology in which the company specialized. The principal technology of Raychem (the name is a contraction of Radiation Chemistry) is the combination of advanced polymeric and radiation techniques.

There was testimony before the district court establishing that there were between 50 and 75 polymeric materials available

as insulating material for wire. Raychem had previously produced insulation using polyethylene, a material known to have good electrical insulation properties. However, polyethylene had a low temperature rating, poor solvent resistance, and a number of other undesirable characteristics. As was well known in the trade, these properties could be improved by placing a secondary or outer layer of insulation over the polyethylene. But there was no universal material which was good for all the desired characteristics of acceptable airplane wire. Further, interactions between the materials made prediction of the characteristics of a combined insulation difficult. For example, Raychem had previously experimented with a Teflon protective layer over polyethylene. This insulation burst when internal pyrolysis of the polyethylene emitted gasses which could not escape through the Teflon. In developing the wire in suit for General Dynamics, Raychem considered thick-walled crosslinked polyethylene, polyethylene with glass fillers, crosslinked Kynar over polyethylene, fluorinated theylene propylene rubber over crosslinked polyethylene, Kynar over polyvinylchloride and others.

Of the materials tried, the crosslinked Kynar over crosslinked polyethylene combination was the only one to give any indication of satisfying the General Dynamics requirements. Tests were performed to determine whether that wire construction could meet all the proposed standards. The district court found that these tests had some unexpected and surprising results. First, the test for a temperature rating resulted in an unprecedented phenomenon. Because testing a wire for 10,000 hours would be prohibitively time consuming, the government developed, and the industry used, a short period-high temperature test to predict a temperature rating for 10,000 hours. The actual measurements would be plotted on a graph, and a straight line extended from the plots to determine the temperature at which the wire would have a service life of 10,000 hours. Under the initial tests there were indications that crosslinked Kynar over

crosslinked polyethylene would fail to meet the required 135°C temperature rating. Further testing, however, showed that the graph of the time-temperature results had a dog-leg. This dog-leg raised the prediction of the temperature at which the wire would have a service life of 10,000 hours, to 135°C.

The addition of antimony oxide to the polyethylene layer resulted in another surprise. That construction met the ash formation requirement of the flammability test which General Dynamics set down for the replacement wire, and was exceptionally flame retarding. Antimony oxide had not been previously used alone as a flame retardant, although it had been used in combination with other additives. To account for this unexpected performance, Raychem proposed a theory in its patent application that the Kynar outer layer provided an oxygen barrier. This theory has since been discarded. Raychem now suggests that a chemical combination occurs between the antimony oxide and the hydrogen fluoride that is released from the Kynar when the wire is subject to heat. The resulting antimony fluoride compounds, Raychem claims, are flame retardants.

Raychem proposed the wire to General Dynamics, and after further testing it was accepted under Mil-W-81044 for use on the F-111 aircraft. It subsequently was used on the Boeing 747 and the C5A. In August, 1966, the Patent Office issued the patent in suit. The Defense Department obtained from Raychem a royalty free license for wire procured from any source. Consequently, the wire used on government aircraft is not involved in this suit. ITT's Suprenant Division, however, sold 44 wire to commercial users without authorization as well as to the government under the royalty free license. ITT's actions led to a charge of infringement, which is not actually contested, and to this suit.

I. Obviousness

In order for a claimed invention to be patentable it must not be obvious to one of ordinary skill in the art to which the

invention pertains.[2] The Supreme Court has defined a court's task in evaluating a charge of obviousness as follows:

> "While the ultimate question of patent invalidity is one of law, . . . the § 103 condition, which is one of three conditions, each of which must be satisfied, lends itself to several basic factual inquiries. Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or non-obviousness of the subject matter is determined." *Graham* v. *John Deere Co.*, 383 U. S. 1, 17 (1966).

Accordingly, this court has often stated that the determination of obviousness, although within limits a question of law, is essentially one of fact. *Forbro Design Corp.* v. *Raytheon Co.*, Nos. 75-1151-52 at 9 (1st Cir., Mar. 22, 1976); *Shanklin Corp.* v. *Springfield Photo Mount Co.*, 521 F. 2d 609, 616 (1st Cir. 1975); *Koppers Co.* v. *Foster Grant Co.*, 396 F. 2d 370, 372 (1st Cir. 1968). ITT contends that the claims in the Lanza Patent are obvious as a matter of law. It asserts that the new insulation is merely a combination of known materials, put together in a known pattern, which exhibits predictable characteristics. Although many patents covering new combinations of old materials have been invalidated for obviousness, *e.g.*, *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co.*, 396 U. S. 57 (1969); *A & P Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147

[2] "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. . . ." 35 U. S. C. § 103.

(1950)[3]; *Dale Electronics, Inc.* v. *R. C. L. Electronics, Inc.*, 488 F. 2d 382 (1st Cir. 1973), such new combination inventions are not inherently unpatentable. *See United States* v. *Adams*, 383 U. S. 39 (1965). The relevant legal standard is sometimes defined as whether the new combination "result[s] in an effect greater than the sum of several effects taken separately." *Anderson's-Black Rock, Inc.* v. *Pavement Salvage Co., supra*, at 61, quoted in *Sakraida* v. *Ag Pro, Inc.*, 44 U. S. L. W. 4477, 4480 (April 20, 1976).

Based on the district court's findings of fact, we hold that the invention claimed is patentable under this standard. The court found that the temperature rating of the wire insulation was "unpredictably high" as compared to the temperature ratings of its components. Also, as noted above, the wire insulation was unexpectedly flame resistant. Thus, the findings establish a sufficient "synergistic" effect between the materials in the new combination, to cross the legal border line from a combination which produces a "more striking result" to one which constitutes a patentable invention. *See Sakraida* v. *Ag Pro, Inc., supra*, at 4480.

ITT's contentions concerning obviousness thus resolved themselves into claims that the district court's findings were clearly erroneous. *See Forbro Design Corp.* v. *Raytheon Co., supra*, at 9; Fed. R. Civ. P. 52(a). We have carefully reviewed the appendix supplied by the parties and have discovered no finding of fact which leaves us with the "firm conviction that a mistake has been made". *United States* v. *Gypsum Co.*, 333 U. S. 364, 395 (1948).

In general, ITT objects to the district court's findings that the test results were unexpected and surprising, and that experts in the field, including ITT employees, showed skepticism that the wire could perform as described. The various findings, claimed

[3] The patent in this case was invalidated for "lack of invention". Section 103 was not enacted until 1952.

to be erroneous, including the findings of unexpected ash formation, temperature rating, and exceptional flame resistance, are all supported by testimony and exhibits in the record. Although the supporting evidence was controverted by ITT's experts, we cannot say the findings are clearly erroneous.

The second category of asserted errors of fact concerns the district court's rejection of four specified prior publications as rendering the Lanza claims obvious. Two of these publications—the Mathes Patent, U. S. Patent No. 2,929,744, and the British Patent No. 860,811—are of limited relevancy to the claims in the Lanza Patent. The Mathes Patent claims an insulation consisting of an inner layer of irradiated polyethylene and an outer layer of resinous material, i.e., varnish, as well as a process of preventing deterioration of polyethylene by covering it with a layer of resin material. The district court found that, apart from teaching double walled construction, a practice known from the 1930's, the patent did not suggest the wire insulation in the Lanza Patent. Varnish has little resemblance to Kynar: the effect of the Mathes patent is due to the low oxygen permeability of varnish when subjected to heat; Kynar, on the other hand, increases in oxygen permeability when heat is applied.[4] The British patent claims a process of creating thick-walled crosslinked polyethylene insulation by applying multiple thin layers and bombarding the layers with electrons. The patent also indicated that an outer layer of neoprene rubber could be applied. This is primarily a process patent which covers the problem of crosslinking a thick wall of polyethylene insulation by bompardment with high energy electrons.[5] The district court found that the

[4] Varnish, a thermosetting material, does not soften and flow when heat is applied. Kynar is a thermoplastic material; it softens when heat is applied, and its oxygen permeability is thereby increased.

[5] X-rays and Gamma rays are very penetrating and can produce the desired structural changes of crosslinkages in the polyethylene to a considerable depth. In contrast, electrons have a reduced penetrating power. The British patent describes a process to manufacture a thick-walled insulation by layering and bombarding each polyethylene layer separately.

British patent had no relevance except as to reaching the use of crosslinked polyethylene as an insulation material. We have no trouble in finding that the district court did not commit clear error in regard to these two patents.

The other two publications cited by ITT hold much greater relevance to the claims in the Lanza Patent. One is a fourteen page brochure, used to promote Kynar by its manufacturer, Pennsalt Corporation. The brochure discusses Kynar's key properties, the forms in which it can be used, its applications, and methods of fabricating it. ITT claims that the brochure is relevant to the subject matter of the Lanza Patent because it suggests the use of Kynar as a wire insulation material and it describes Kynar as having several desirable qualities for secondary insulation: toughness, flame resistance, and thermal stability. Among over a dozen illustrative uses, ranging from "heavy walled unsupported pipes" to "sterlizable packaging", is its use for "extruded jackets and prime insulation for high temperature wire insulation." Subsequently, the brochure notes that Kynar was undergoing "long term field tests" for many applications, one of which was described thusly: "in primary insulation and in jackets for multiconductor cables, KYNAR has performed successfully at temperatures from —80° to 300° F". There was, however, as the district court noted, no indication that Kynar should be crosslinked or that it should be used in combination with other materials. The court was supported in its reading of the suggested uses as confined to primary single layer wire insulation and jacketing for multiconductor cables rather than its use as part of a two layer insulation.

The district court did not discuss the disclosure of the properties of Kynar contained in the brochure. But, contrary to ITT's claims, we cannot see how the description of the properties of Kynar renders the claims in the Lanza Patent obvious. The district court found, and there is ample evidence to support this finding, that the performance characteristics of 44 wire were unexpectedly superior to that predicted by its composition. We

can see, with the benefit of hindsight, how the brochure, if read imaginatively, would suggest to one skilled in the art that Kynar would be a good material to experiment with. But how to use it, in what structure and combination and for what precise product would have been made no more obvious than the teaching of the advertisements in *Abington Textile Machine Works* v. *Carding Specialists (Can.) Ltd.*, 249 F. Supp. 823, 833 (D. D.C. 1965).

The final example of prior art cited by ITT is the Timmerman patent which teaches the characteristics of irradiated or crosslinked Kynar.[6] In example II of the patent, a crosslinked Kynar insulation was reported to have a one hour life at 200° C. Because the standard of performance under the specifications for 44 wire is 120 hours at 200°C (to obtain a 10,000 hour 135°C rating), the district court found that the Timmerman patent taught away from using Kynar to insulate wires for high performance aircraft. ITT suggests that the district court misinterpreted the teaching of the Timmerman patent. The patent as a whole teaches the superior performance of crosslinked Kynar. The one hour life at 200°C reported in the patent was not the same measurement as the life cycle tests required by Mil-W-81044. But the record does not disclose the differences between the Timmerman test and the military specification test. Nor does the record show exactly what the Timmerman report of the one hour life at 200°C would mean to a scientist in relation to the performance of crosslinked Kynar under the life-cycle, specification tests. We, therefore, on the record below, cannot set aside as clearly erroneous the district court's finding that the Timmerman patent would have led one away from the use of crosslinked Kynar for high performance aircraft wire.

[6] The Timmerman patent, U. S. Patent No. 3,142,629, was cited by the patent examiner. At trial ITT asserted that Raychem had violated its duty of full disclosure of prior art to the Patent Office in failing to cite the other three publications. The district court found that Raychem had fulfilled its duty. Therefore, the presumption of validity of the patent was unimpaired. 35 U. S. C. § 282.

Finally, the court below found that 44 wire enjoyed wide commercial success and filled a demonstrated need. While such criteria cannot salvage otherwise obvious patent claims, they may be considered in a close case. *Graham* v. *John Deere Co., supra,* at 17; *Potter Instrument Co.* v. *ODEC Computer Systems, Inc.,* 499 F.2d 209, 211 (1st Cir. 1974). This case presented such a close question of obviousness in the context of a combination patent. In such circumstances, the claims of the patent should be rigorously examined. *Sakraida* v. *Ag Pro, Inc., supra.* We are mindful, however, that ITT had the burden of persuasion both as plaintiff and as the opponent of the presumption of validity, 35 U. S. C. § 282, which attaches to issued patents. Because the claims of the Lanza Patent cannot be held obvious as a matter of law, and the district court's findings of fact were not clearly erroneous, we affirm its judgment that the patent was not obvious.[7]

II. The "Best Mode" Issue

ITT's second claim against the patent is that the patent failed to comply with the disclosure provision of 35 U. S. C. § 112, concerning the "best mode" to reproduce the invention. In par-

[7] In a recent case, *Deering Milliken Research Group* v. *Beaunit Corp.,* No. 74-2233 (4th Cir. Feb. 12, 1976), Mr. Justice Clark wrote: "[t]he alleged infringer, Beaunit, had the burden of proving that the patent, presumed to be valid, did not meet the statutory requirements of validity. . . . The district court's decision that the 'wrap around' feature of Lesley's invention was non-obvious under § 103 was a determination, as a question of law, that Beaunit had not met its burden. Thus, we are free to disagree with the district court even if we cannot brand his conclusion on the issue of obviousness clearly erroneous." Slip op. at 6. We note, however, that the opinion goes on to establish that the infringer had conclusively shown that a prior patent had disclosed the purported invention. It concludes with the holding that the trial court's contrary finding was "clearly erroneous". Therefore, we are not persuaded that a different standard of review than the one indicated in the text exists for issues of obviousness.

ticular, ITT claims that the patent does not disclose the precise chemical formulations which Raychem used to produce its commerical 44 wire. Example 1 of the patent, ITT states, does not show the use of two copolymers[8] in the polyethylene layer of the wire insulation. Nor did Raychem disclose the formula of a secret, proprietary compound, known to this litigation as Compound X, which is added to the Kynar layer in its commercial wire. Raychem, however, claimed that the omission of these details of its commercial operation did not violate the "best mode" requirement of 35 U. S. C. § 112. The copolymers and Compound X were not used to change the qualities of the finished product, but to aid in the extrusion[9] of the plastics during the manufacturing process.

The district court agreed with Raychem. In regard to the copolymers, it found that they were well known in the trade, and were not part of the claim in the Lanza Patent. Compound X was found to have no effect on the qualities of the finished 44

[8] The testimony before the district court established the following definitions:

> "the word 'homopolymer' defines a polymer made from one single monomer, such as polyvinylidene fluoride alone, and the word 'copolymer' describes the polymer made from a mixture of different monomers."

Many copolymers which have a relatively large amount of one monomer, and a minor amount of a second monomer are referred to as homopolymers of the dominant monomer of the mixture. Thus the word "polyethylene" could describe a copolymer consisting primarily of ethylene but with minor amounts of another monomer.

[9] From the testimony at trial, a definition of extrusion:

> "This is a process for making useful articles out of polymers in which a machine called an 'extruder' is very much like an oversized, heated meat grinder. At one end of the machine the polymer, in the form of small cubes, perhaps an eighth of an inch, is placed on the side and heat then melts these cubes and, as the screw of the machine is turned, the material . . . comes out much like toothpaste out of a tube."

wire, and to relate only to the manufacturing process utilized by Raychem. Accordingly, it rejected the "best mode" challenge to the patent.

Section 112 requires that a patent "set forth the best mode contemplated by the inventor of carrying out his invention." An adequate disclosure is one which enables "one skilled in the art to practice the invention." *Universal Oil Co.* v. *Globe Co.*, 322 U. S. 471, 484 (1944); *see Illinois Toolworks, Inc.* v. *Solo Cup Co.*, 179 U.S.P.Q. 322, 366-69 (N. D. Ill. 1973). This court has articulated the requirement imposed by § 112 as disclosure of "specific material which will make possible the successful reproduction of the effects claimed by the patent." *Dale Electronics, Inc.* v. *R. C. L. Electronics, Inc., supra,* at 389.

As the invention in the Lanza Patent concerns the combination of a crosslinked polyolefin (polyethylene in Example 1) covered with crosslinked Kynar as a wire insulation, the specifications required to be disclosed are those which permit the insulation to be copied with success. As the district court found that the unrevealed copolymers of the polyethylene were well known to the trade, and this finding is not clearly erroneous, the disclosure in Example 1 that the inner layer of the insulation should be comprised of crosslinked polyethylene was sufficient. *See Application of Gay*, 309 F. 2d 769, 773 (C. C. P. A. 1962).

ITT's contentions concerning the mysterious Compound X, while initially more disturbing, also lack merit. The Lanza Patent covers a product, 44 wire; it does not make any claim to the process of manufacturing that product. The district court found that the addition of Compound X had no effect on the qualities of the finished insulated wire. Moreover, its addition to the Kynar was not crucial to the manufacturing process, but merely made the production of 44 wire more profitable by allowing the Kynar to be extruded over the wire at a faster rate. That Compound X is not essential to the production of the patented wire distinguishes this case from *Flick-Reedy Corp.* v. *Hydro-Line Mfg. Co.*, 351 F. 2d 546, 550-51 (7th Cir. 1965),

which invalidated a product patent for failure to disclose the specifications of a "special tool" essential to the successful reproduction of the product. *See generally, Illinois Toolworks, Inc.* v. *Solo Cup Co., supra,* at 367. Thus, we agree with the district court that information concerning Compound X was not required to be disclosed in order to satisfy § 112 requirements.

III. Fraud

ITT contends that the district court erred in not finding the Lanza Patent to be procured by fraud and either invalid or unenforceable. In support of this assertion, appellant states that Raychem failed to comply with its duty of full and frank disclosure to the Patent Office in that it (1) failed to cite relevant prior art; (2) misrepresented the results of tests; (3) withheld negative or neutral results of tests while reporting positive results; and (4) inadequately informed the Patent Office of preexisting types of aircraft wire. The district court found the omitted prior art cited by ITT largely irrevelant to the patent in suit, the omitted test results irrevelant to the claims in the patent, and the disclosure of earlier types of aircraft wire adequate. It did not specifically address ITT's claim that Raychem misrepresented test results by stating that they were made in accordance with the construction specified in the example while, in actuality, they were of Raychem's commercial wire. This argument, however, is merely a restatement of ITT's claim that Raychem failed to reveal the "best mode" of making the wire. As the district court resolved this issue against ITT, supportably in our view, we see no merit in ITT's claim here. Finally, the district court found that Raychem had "dealt with the Patent Office in candor and good faith."

These findings are of fact, and, upon review, are not clearly erroneous. *See Cataphote Corp.* v. *Desoto,* 450 F. 2d 769, 772 (9th Cir. 1971). The finding of good faith on the part of Raychem completely undermines any contention that the patent should be declared invalid or unenforceable because of failure

to disclose information to the Patent Office. Although the law is not free from doubt, courts considering allegations of fraud in procurement of a patent have held that some element of wrongful conduct—intentional misrepresentation or inequitable, reckless, or grossly negligent conduct—is a necessary predicate to rendering a patent unenforceable in the courts. *See In re Multidistrict Litigation Involving Frost Patent,* 398 F. Supp. 1353, 1365-70 (D. Del. 1975). Recently, in this circuit, we considered a case in which the district court found a patent partially unenforceable for conduct characterized as "affirmatively deceptive". *Norton Co.* v. *Carborundum Co.,* 397 F. Supp. 639 (D. Mass. 1975), *aff'd on other grounds,* Nos. 75-1309-10 (Feb. 1976). This court has not defined the exact standard of wrongful conduct that would disable an otherwise valid patent from enforcement. *See Norton Co.* v. *Carborundum Co.,* Nos. 75-1309-10, Slip op. at 5 n. 11. We decline to do so here, for ITT, aside from its allegations of fraud, has failed to establish any wrongful conduct on the part of Raychem.[10] In these circumstances, the district court properly found ITT's allegations of fraud in the procurement to be without merit.

The judgment of the district court is affirmed.

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[10] ITT protests the district court's suggestion that it should have called the patent examiner to testify concerning the relevancy of the omitted prior art. The company claims that the examiner could not have testified to matters of opinion or speculation. This would seem to be a correct statement of the law. *Standard Packaging Corp.* v. *Curwood, Inc.,* 365 F. Supp. 134, 136-38 (N.D. Ill. 1973). The district court's suggestion, however, was in relation to ITT's complete failure to present evidence of fraudulent misconduct.

APPENDIX A (continued)

UNITED STATES COURT OF APPEALS

FOR THE FIRST CIRCUIT

No. 75-1373

INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION,
Plaintiff-Appellant,

v.

RAYCHEM CORPORATION,
Defendant-Appellee.

Judgment

Entered June 25, 1976

This cause came on to be heard on appeal from the United States District Court for the District of Massachusetts, and was argued by counsel.

Upon consideration whereof, It is now here ordered, adjudged and decreed as follows: The Judgment of the District Court is affirmed.

By the Court:

/s/ DANA H. GALLUP,
Clerk.

[cc: Messrs. Hally, Raymond, Hulbert & Geriak]

APPENDIX B

UNITED STATES DISTRICT COURT

DISTRICT OF MASSACHUSETTS

Civil Action No. 71-2939-T

INTERNATIONAL TELEPHONE AND TELEGRAPH CORP.
v.
RAYCHEM CORP.

Memorandum and Order

TAURO, D. J., July 29, 1975

This is a declaratory judgment action, seeking an adjudication of invalidity and non-infringement of United States Patent No. 3,269,862, entitled "Crosslinked Polyvinylidene Flouride over a Crosslinked Polyolefin" which issued on August 30, 1966, in the names of Vincent L. Lanza and Edward C. Stivers (Lanza patent) on an application filed October 22, 1964. Defendant has counterclaimed for patent infringement.

Plaintiff, International Telephone and Telegraph Corporation (ITT) is a Delaware corporation, organized and existing under the laws of the state of Delaware. Plaintiff's ITT Surprenant Division (Surprenant), having its principal place of business in Clinton, Massachusetts, makes the insulated wire alleged to be an infringement of the Lanza patent.

Defendant, Raychem Corporation (Raychem), is a California corporation, organized and existing under the law of the state of California, and has its principal place of business in Menlo Park, California. Raychem owns the Lanza patent by virtue of an assignment executed by the patentees Lanza and Stivers.

Jurisdiction over the subject matter of this action is based on 28 U. S. C. § 1338(a). Venue is proper for the declaratory judgment action pursuant to 28 U. S. C. § 1391 and is proper for the counter-claim pursuant to 28 U. S. C. § 1400(b).

Plaintiff asserts that the patent is invalid because of obviousness, 35 U. S. C. § 103, because Raychem failed to comply with the best mode requirement of 35 U. S. C. § 112, and because the issuance of the patent was induced by fraud. There is no serious question that the patent, if valid, has been infringed by ITT. Accordingly, Raychem's basic position is that the patent is valid and has been infringed.

The controversy in this case involves a wire having as its insulation a first (primary) layer of cross-linked polyolefin such as cross-linked polyethylene and a second (secondary) outer layer of cross-linked polyvinylidene fluoride (referred to herein by its trade name, Kynar). This wire is particularly suitable for use on high performance jet aircraft and has been qualified for aircraft under Military Specification Mil-W-81044. Such wire is thus referred to as 44 wire in the trade.

The wire claimed in the patent may contain triallyl cyanurate (TAC) in the Kynar layer as specified, e.g., in claim 2. Further, the wire insulation may contain antimony oxide in the polyethylene layer as specified, e.g., in claim 3.

Aircraft wire of the type in issue is used on airplanes to carry electricity to various parts of the airplane and also to give electronic signals for the extensive electronic equipment used on the plane. Typically, many miles of such wire are used on each airplane.

I. History of the Prior Art

Early insulation for aircraft wire was very crude and was often only paper covering the conductors to offer electrical insulation. Later, natural rubber was used as an insulating material. Since it was flammable it did not have very good high

temperature properties. In the 1940s, a widely used wire had an insulation which consisted of a first layer of polyvinylcholoride (PVC) and an outer layer of nylon. As aircraft became more sophisticated, the need for wire that would withstand higher temperatures and have better flammability properties became apparent. One response was a wire consisting of silicone rubber covered by a glass braid. Another response was a wire, manufactured by ITT, consisting of Teflon containing a mineral filler.

Military specifications have been prepared for most wire used in aircraft.[1] These specifications are prepared by the Government in consultation with contractors who build the aircraft. The military specifications set forth a number of desired and necessary characteristics for aircraft wire in addition to electrical insulation. A particular wire cannot meet a specification if it is lacking one or more of the characteristics specified. Often modification of a wire insulation to improve one characteristic will result in the deterioration of other characteristics or properties.

While the requirements are not uniform, one common requirement is that the wire possess a service life of 10,000 hours or more at a particular temperature. The highest temperature at which a particular wire has a useful service life for 10,000 hours is called its temperature rating. In addition to the heat aging resistance expressed as a temperature rating, other characteristics which are of primary concern for aircraft wire are: (1) Low weight, (2) Flammability, (3) Solvent resistance, (4) Abrasion

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[1] Various wires having military specifications and their temperature ratings are set forth below:

(a) Mil-W-5086 (PVC covered with nylon) rated at 105°C;

(b) Mil-W-16878 (Type B), (PVC) rated at 105°C;

(c) Mil-W-8777 (silicone rubber covered with glass braid) rated at 200°C;

(d) Mil-W-22759 (MS 18,000) (Teflon containing a mineral filler), rated at 200°C;

(e) Mil-W-81044 (cross-linked Kynar over cross-linked polyethylene) rated at 135°C. (The wire in this suit.)

resistance, (5) Electrical resistance, (6) Flexibility, (7) Processability (capacity of the wire to be stripped, marked, or sealed with other wires). For each of these characteristics, certain tests are performed to determine if the wire complies with the specifications that are required for a particular use of the wire.

In 1963, General Dynamics was awarded the contract for developing the Air Force version of the F-111. In the first eleven that were built, General Dynamics used wire insulated with mineral filled Teflon which had a temperature rating of 200° and was sold by ITT. Due to concern over the weight of the aircraft, General Dynamics embarked on a Super Weight Improvement Program. As part of that program, they determined that the mineral filled Teflon wire was too heavy. They also determined that a replacement wire need have a temperature rating of only 135°C. General Dynamics then made a survey of the wire industry to find a suitable replacement. Packard Electric and ITT both proposed a wire that was unsuitable. ITT's proposal was essentially a thin-walled version of the mineral filled Teflon wire previously found unacceptable.

Raychem became aware of this problem in the summer of 1963. They consulted with General Dynamics regarding the requirements for the replacement wire. Among other things, they were informed that the replacement wire must have a temperature rating of 135°C, good cold bend, the flammability characteristics of wire sold under Mil-W-8777, the toughness requirements of Mil-W-5086, and must be lighter in weight and less expensive than the mineral filled Teflon wire it was to replace. At this time, there was no wire on the market that met all of these characteristics.

At that time, Raychem was a relatively young corporation, having started in this business in 1957. It had previously experienced some success with polyethylene insulation, including a double-layer polyethyelene cable covered by an aluminum sheath. It had also experienced some notable failures in double-layer insulation construction including a nylon jacket over polyethyelene which burst when internal pyrolysis of the polyethylene emitted gases that could not escape through the Teflon jacket.

When Raychem learned of General Dynamic's search for a suitable wire for the F-111, it experimented with a number of possible wire constructions in an attempt to produce a satisfactory wire. At that time there were between 50 and 75 polymeric materials available as insulating materials for wire. There was no universal material which was good for all of the desired characteristics. Among the constructions considered by Raychem were thick-walled cross-linked polyethylene, polyethylene with glass fillers, cross-linked Kynar over polyethylene, flourinated ethylene propylene rubber over cross-linked polyethylene, Kynar over PVC, flourinated ethylene propylene rubber over silicone rubber, fluorinated ethylene propylene rubber over nylon and Kynar alone.

Because of scientists' inability to predict the characteristics of a given material before experiments are performed and because the complex interaction between different materials often produces surprising and unexpected results, the business of creating new wire insulations has sometimes been referred to as more of an art than a science. This was the experience of Raychem in developing the wire the led to the patent in suit.

Of all the materials that they tested, only cross-linked Kynar over cross-linked polyethylene gave any indication of being suitable for the F-111. One surprising result was found in the heat aging requirement. Since it would be prohibitively expensive and time-consuming to subject each proposed wire to the full 10,000 hours called for to determine its temperature rating, industry practice was to subject the wire to a higher temperature for a shorter period of time and extrapolate that result to predict that temperature rating of the wire for 10,000 hours. For most wire insulations, the time-temperature graph depicts a straight line, indicating a progressively longer life as the temeprature is reduced.

Based on such a high-temperature-short time test, there were indications that cross-linked Kynar over cross-linked polyethylene would not meet the required 135°C temperature rating. Under actual tests, however, the graph of the time-temperature rating of this wire showed an unexpected dog-leg, enabling the wire to qualify for a 135°C rating.

When Raychem decided to add antimony oxide to the polyethylene layer, another surprising result was obtained. That construction met the ash formation requirements of the flammability tests for the Mil-W-8777 specification, one of the requirements that General Dynamics had imposed on the replacement wire they were seeking. This construction also had exceptional flame retardant characteristics. To account for this phenomenon, Raychem proposed a theory in its patent application that the improved flame retardancy was due to an oxygen barrier provided by Kynar. Raychem no longer considers that theory valid and has since proposed that the result can be explained by a chemical combination of the antimony oxide and hydrogen flouride that is released from Kynar when it is subject to heat. Whatever the theory to explain it, the observed fact was that this combination had exceptionally good flame retardant characteristics and met the temperature ratings required by General Dynamics.

The wire insulation of the patent in suit also had excellent abrasion resistance, good solvent resistance, provided good electrical insulation and was flexible. The wire was much lighter than the mineral filled Teflon which had previously been used on the F-111. Use of the new wire would result in a savings of 275 pounds per aircraft.

Since General Dynamics required that the replacement wire be covered by a military specification, Raychem worked with General Dynamics and Grumman (contractor for the Navy version of the F-111) to conduct the extensive laboratory tests necessary to submit the wire for a military specification. On May 19, 1964, Mil-W-81044 was issued by the Navy Bureau of Weapons on the wire of the patent in suit. By August 1964,

the new wire (44 wire) was used on the twelfth F-111. Thereafter, 44 wire was used on all subsequent F-111's without failure and was subsequently used on many other aircraft, including the Boeing 747 and the C5A. By all accounts, the wire was adjudged a commercial and technical success, filling long-felt need in the industry.

In October 1964, Raychem applied for the patent in suit and on August 30, 1966, the Patent Office issued Patent No. 3,269,862 which describes this wire.

When its mineral filled Teflon wire was immediately and totally displaced from the F-111 by the wire of the patent in suit, ITT immediately obtained a sample of Raychem's wire, sent for an analysis of the wire and then made a copy of the wire. ITT's Suprenant division thereafter sold the wire to the Government along with Raychem. Since the demand for the wire was so great, no price competition was engaged in at that time.

After the patent was issued, ITT approached Raychem and sought a license at a royalty rate of 3% for commercial sales. This was refused. Thereafter, the Government requested a royalty free license which was granted by Raychem on March 7, 1967. This allowed the Government to procure 44 wire from anyone in the industry without royalties being paid to Raychem.

Raychem has not contested ITT's sales to the Government under this royalty free license. When the request for a commercial license was refused, ITT proceeded to sell its 44 wire to commercial customers without authorization. When notice of infringement was served by Raychem, ITT filed this suit seeking a declaration of invalidity of the patent.

II. Obviousness

In many ways, the invention involved in the patent in suit is simplicity itself. In its basic application, it teaches the creation of a wire insulation comprised of two materials, both commer-

cially available, neither invented by Raychem. Layering these materials, in their cross-linked state and, in the preferred mode, extruding them by irradiation, is the essential contribution of Raychem. Simplicity does not, in itself, detract from inventiveness. *See, e.g., Lincoln Stores* v. *Nashua Manufacturing Co.*, 157 F. 2d 154, 163 (1st Cir. 1946).

There is no serious question that the patent meets the utility and novelty requirements of 35 U. S. C. § 101. Wire insulation in this form did not exist on the market prior to the work of Raychem described in the Lanza patent. The product gained immediate and wide-spread acceptance and filled an important need in the aircraft industry.

ITT's basic claim in support of its contention of lack of invention is that the wire insulation was obvious to one skilled in the prior art and that the patent in question involved nothing more than applying new materials to an old technique as those materials became available on the market.

ITT has charged that the patent is invalid because of obviousness. Raychem has rejoined that the invention is obvious only in the way that the means for opening a safe became obvious after its combination is known. *Cf. In re Luvisi*, 342 F. 2d 102, 107 (C. C. P. A. 1965).

ITT first contends that since double-layered insulation was a technique acquired in the 1930s, subsequent refinements in the art may be described as merely using additional materials with this basic technique as those materials became available. ITT then suggests that Kynar became available on the market shortly before Raychem described 44 wire and suggests that it was obvious to use Kynar over polyethylene as the Lanza patent teaches.

Raychem counters this argument by pointing out that Kynar was available commercially since 1960 and that others had tried and rejected Kynar. Indeed, ITT's own chemists testified that they had "placed Kynar on the shelf" after experimenting with it. Raychem also points out that Kynar was just one of 50-75

other polymeric materials that were available on the commercial market for use as insulating materials. The manufacturers of these materials, to promote their sale, made numerous claims as to their efficacy and desirability as insulating materials. The trade brochures and other advertisements gave the manufacturers in the wire and cable industry a veritable blizzard of materials. Raychem contends that even to sort out these various claims was a task that was far from obvious.

In support of its contention that the Lanza patent was well within the prior art and so was obvious to one skilled in the art, ITT has relied on four prior publications: (1) the Mathes patent, U. S. Patent No. 2,929,744, (2) the British patent No. 860,811, (3) the Timmerman patent, U. S. Patent No. 3,142,629, and (4) the Pennsalt brochure, Pennsalt Technical Bulletin VF2R-61. ITT has suggested that each of these would lead ineluctably to the Lanza patent. Raychem disagrees.

1. The Mathes patent

The Mathes patent was filed on November 2, 1954 and issued on March 27, 1960. It disclosed a two-layer insulation for wire consisting of a first layer of irradiated cross-linked polyethyelene and a jacket of cured resinous material (varnish). ITT claims that this patent teaches the use of double-wall construction and specifically suggests the use of a durable, flexible jacket over polyethylene. ITT further claims that varnish suggests Kynar and that the Lanza patent involved only the substitution of Kynar for varnish when Kynar became commercially available.

Although the Mathes patent was not listed as a prior art publication in the Lanza patent, it was in the same class and subclass as the Lanza patent. In conducting his review, the patent examiner would have, or should have, encountered the Mathes patent. Since he must be deemed to have considered it, the patent examiner's omission of the Mathes patent as a relevant prior art publication is some evidence that it did not suggest the Lanza patent. *See, e.g., Union Carbide Corp.* v. *Filtrol Corp.*, 170 U. S. P. Q. 483, 516 (C. D. Cal. 1971).

Wholly apart from that consideration, the Mathes patent must be rejected as a relevant publication for a number of reasons. To the extent that it teaches the use of double-walled insulation, it adds nothing to the prior art. This practice had been known generally since the 1930s and is not part of the claim in the Lanza patent. The relevant question is whether varnish suggests Kynar.

The characteristics of the varnish in the Mathes patent and Kynar in the Lanza patent are dissimilar. The varnish jacket tends to be inflexible, hard, and brittle, subject to cracking by repeated flexing. While varnish over polyethylene has a relatively high temperature rating, this is only one of the characteristics desired by General Dynamics in its search for a replacement wire. The other considerations, flexibility, light weight, electrical and abrasion resistance, and cut-through strength differ markedly in comparing varnish and Kynar. The high temperature rating of varnish no more suggests Kynar than it does Teflon, which has an even higher temperature rating. Raychem's own experiences indicated that Teflon over polyethylene was a disastrous failure.

Varnish is a thermo-setting material that does not soften and flow when heat is applied. Kynar is a thermo-plastic material that softens when heat is applied. The Mathes patent indicates that varnish reduces oxygen permeability.

The oxygen permeability of thermo-plastic materials such as Kynar increases greatly as the temperature increases. To the extent that one seeks to reduce the oxygen permeability in order to reduce the flammability of the polyethylene layer, the Mathes patent teaches away from the use of thermo-plastic materials such as Kynar.

Varnish is not Kynar or cross-linked Kynar, nor does it suggest Kynar. The Mathes patent is insufficient as a prior art publication to demonstrate obviousness in the Lanza patent.[2]

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[2] The secondary issue, whether the Mathes patent is a relevant prior art publication that should have been included in the Lanza patent application, is discussed in Part IV *infra*.

2. The British patent No. 860,811

This patent teaches insulation of a cable of cross-linked polyethylene. A thick layer of insulation was necessary and this was achieved by applying multiple thin layers of polyethylene, irradiated separately. The patent indicated that an outer layer of vulcanized neoprene could be applied. Neoprene is an old wire insulating material that is subject to deterioration on aging and so is not suitable for high performance aircraft. Moreover, the final construction is a cable construction having a thick coating of insulation which is just the opposite of the claimed wire that achieved commercial success because of its thin-walled construction. The patent teaches only the use of cross-linked polyethylene as an insulating material. The unique contribution of the Lanza patent—cross-linked Kynar over cross-linked polyethylene—is not suggested by this patent. Finally, this patent indicates that a construction of dissimilar materials is not preferred.

3. The Timmerman patent

This patent relates to radiation of Kynar extruded over wire. Example II, the only relevant example, indicates a one hour life at 200°C was obtained. In order to obtain a 135° rating, the wire of the patent in suit must withstand 120 hours of exposure at 200°C to pass Mil-W-81044. Thus, the Timmerman teaching would lead one away from the use of irradiated Kynar to insulate wires for high performance aircraft. Since the Timmerman teaching is confined to the use of Kynar as a primary insulation, there is nothing in the Timmerman patent that suggests the use of Kynar with another polymer to achieve the combination of properties desired for this high performance wire.

4. The Pennsalt Brochure

This fourth publication cited by ITT as a relevant prior publication is a sales brochure, written by Pennsalt, the manufacturer of Kynar. Used as a sales tool, brochures of this type are considered unreliable from a scientific viewpoint in the trade. The proffered uses are, in many cases, suggestions whose validity

is not demonstrated by practical experiments. The only relevant suggestions given in the brochure are the use of Kynar as a primary single layer insulation over wire and as a jacket for multi-conductor cables. There is no indication in the brochure that Kynar should be cross-linked, nor is there any suggestion that Kynar should be used in combination with other materials. Moreover, there is no indication or discussion of the use of Kynar over polyethylene or cross-linked polyethylene. The reference to jacketing suggests the use of Kynar over a bundle of insulated wires in a cable. This use is qualitatively different from the use of Kynar in the Lanza patent. Even if full weight were given to this sales brochure, it simply does not suggest the wire of the patent in suit and is insufficient as a prior publication to demonstrate obviousness.

Apart from the insubstantial nature of the prior publications cited by ITT as being relevant on the issue of obviousness, there are a number of other considerations that lead ineluctably to the conclusion that the Lanza patent was not obvious to one skilled in the art.

By 1963, cross-linked polyethylene had long been known as a wire insulation. Kynar had been available commercially for several years and the use of cross-linked Kynar as an insulating material was known. ITT, itself, had evaluated the use of Kynar and abandoned it as being unsuitable. Moreover, the trend of the wire industry was away from double-layer insulation and towards single-layer insulation and towards single-layer insulation where that was possible. Thus, when General Dynamics sought a replacement wire in 1963, ITT proposed a single-layer construction. ITT's proposal was merely a modification of the mineral-filled Teflon wire that had been found unacceptable.

The characteristics of the wire of the patent in suit were not obvious and the results obtained on the various tests were surprising. Various individuals in the field, including ITT, were skeptical of this essentially unproven product and were cautious about predicting its performance even after extensive testing.

The temperature rating achieved by cross-linked Kynar over cross-linked polyethylene was higher than the rating given to either of its components. Mr. Campbell of the Naval Research Lab, an acknowledged expert in heat age testing for wires, indicated that the wire claimed in the patent in suit had a rated temperature which was unpredictably high.

While the question of obviousness is essentially a factual determination, the court is aided by reference to a number of established criteria that tend to support a conclusion of non-obviousness. These are a demonstrated need for the product, attempts of others to meet this need, the failure of such efforts, and the acceptance, recognition and adoption of the invention by the industry. The record in this case demonstrates that each of those factors were present. In short, like the combination to a safe that becomes obvious only when disclosed, the patent in suit became obvious only when Raychem told the world that this combination worked and would meet the needs of the aircraft industry.

III. Best Mode Requirement

As a second argument in support of its contention that the patent is invalid, ITT contends that Raychem failed to comply with the best mode requirement of 35 U. S. C. § 112. This section has two primary purposes: first, the patent must be sufficiently specific to demarcate the patented subject matter so that others in the field will know which parts of the field are still open; second, the disclosure must be sufficient so that others can practice the patent successfully.

1. Disclosure of Copolymers

As part of its best mode assertion, ITT claims that Raychem withheld from the Patent Office certain information relating to the use of copolymers of ethylene in the polyethylene layer of the patent in suit. The copolymer materials were DPD 6196 (ethylene ethylacrylate) and DQD 1868 (ethylene vinyl acetate)

which are used as extrustion aids. There are compelling arguments that refute this assertion.

First, it should be noted that the patent does disclose the use of these polymers at column 5, line 63 to column 6, line 2.[3] ITT claims that this disclosure is insufficient since it should have been disclosed in example 1 of the patent. Although these extrusion aids were ultimately used by Raychem in connection with polyethylene, the claims in the patent relate to polyolefins generally and not just polyethylene.

Second, Union Carbide, the manufacturer of these extrusion aids and the holder of a patent granted in 1960 teaching such use, had been actively publicizing the use of such copolymers as extrusion aids long before the patent in suit was applied for. To the extent that the selection of a material as an extrusion aid would have been within the ordinary skill of the art at the time, it is as if that fact were set forth in the patent itself. *See,* e.g., *In re Barrett,* 440 F. 2d 1391, 1393 (C. C. P. A. 1971).

Third, at the time that the patent was applied for, Raychem was not sure whether the use of such aids was ultimately desirable, since the copolymers actually degrade certain properties of polyethylene. Heslop Memorandum, Exhibit K, dated August 21, 1964; Transcript, Vol. 4 at 81.

Finally, the copolymers have nothing to do with the invention, but rather function to aid the extrusion of the polyethylene on the wire. Since this use was well known and since it was not part of the claim of the patent in suit, the fact that Raychem did not specifically mention the use of such aids in example 1 of the patent does not constitute lack of compliance with the best mode requirement.

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[3] U. S. Patent No. 3,269,862, col. 5, line 63 to col. 6, line 2:

> "Furthermore, although the foregoing examples are directed to polyethylene as the inner layer, it is to be understood that other polyolefins, such as polypropylene and copolymers of ethylene with other monomers such as butene-1, vinyl acetate, etc., may be used."

2. Compound X

Compound X is an extrusion aid that is used in extruding the Kynar onto the wire. As such, it neither adds nor detracts from the qualities of the wire of the patent in suit. It is a compound that relates solely to manufacturing process for extruding Kynar. Raychem uses this compound in extruding Kynar for a number of products, including tubing and 44 wire. ITT claims that Raychem's nondisclosure of this compound violates the best mode requirement of 35 U. S. C. § 112.

ITT has asserted that compound X affects significantly the properties of the patented wire, specifically that it prevents or retards discoloration that occurs during heat aging. This assertion, is based on U. S. Patent No. 3,607,827 (Exhibit 158) which did not issue until 1971. That patent does not disclose Compound X in Kynar and so does not support ITT's contention. Raychem introduced evidence relating to series of tests that compared the qualities of 44 wire with Compound X and without Compound X. These tests demonstrate that there was no significant difference in the properties of the patented wire when Compound X was included.

The patent in suit is a wire composed of two layers, cross-linked Kynar over cross-linked polyethylene. It is not a manufacturing process. To sustain ITT's contention regarding the best mode requirement, this court would be required to rule that production specifications are part of the necessary patent disclosure. This is not the intended purpose of patent disclosure. As noted by the court in *Illinois Tool Works, Inc.* v. *Solo Cup Co.,* 179 U. S. P. Q. 322, 368 (N. D. Ill. 1973), "it is normal practice to retain commercial details of a manufacturing process in confidence."

Perhaps the most telling argument against ITT's best mode assertion is the fact that ITT experienced no difficulty in making wire according to the claims of the patent in suit. To the extent that ITT experience difficulty in obtaining high levels of production, this was attributable to the extrusion equipment then

being used by ITT and was not attributable to the failure to include compound X in the Kynar layer. By its acquisition of new extruding equipment in July 1968, ITT eliminated any extrusion problems that previously existed. Exhibit AJ.

IV. Fraud

ITT contends that the patent in suit is not entitled to presumption of validity because of defendant's concealment from the Patent Office of relevant prior art information. ITT further contends that this concealment with Raychem's failure to report other relevant facts to the Patent Office constitutes fraud and invalidates the patent. Raychem contends that the applicants for the patent in suit dealt with the Patent Office with candor and in good faith. Raychem further contends that the applicants did not withhold or misrepresent any relevant or significant prior art or technical information.

1. Prior Art Publications

To expedite processing the patent application, Raychem's counsel filed affidavits indicating that the applicants had examined the prior art and had concluded that the claims were allowable. The application did not cite the Timmerman patent, the Mathes patent, the British patent or the Pennsault brochure. ITT contends that these were all relevant prior art publications that should have been mentioned and that Raychem's failure to do so constitutes fraud.

The decision to include or exclude prior art publications from the patent application is, in the final analysis, a judgment call on the part of the applicant. Including too many publications that are clearly irrelevant can only clutter up the application and may be just as obfuscating and misleading as excluding relevant publications. To convert a good faith judgment call to exclude certain material into bad faith fraudulent concealment requires a strong showing that the excluded material was highly relevant

to the patent in suit. The publications cited by ITT do not constitute such a showing. All four of these publications have been discussed above. They do not invalidate the patent nor do they demonstrate fraud by Raychem.

The Timmerman patent was reviewed and discussed by the Patent Examiner. The Mathes patent, in the same class and subclass as the patent in suit, presumably was considered and rejected by the Patent Examiner. While the publication date of the Pennsault brochure indicates that it was distributed before the patent in suit was applied for, there was no evidence that Raychem received this publication before making its application or that Raychem was even aware of its existence. In any case, the brochure is so marginally relevant to the patent as to be incapable of supporting a finding of willful concealment from the Patent Office of *relevant* prior art publications. The British patent, teaching the use of cross-linked polyethylene in cable construction, was directed to an entirely difference concept. Raychem's attorney made a preliminary determination that this patent could not be relied upon to invalidate the Lanza patent. Not only was that determination made in good faith, but also was accurate.

Apart from the bare allegation of fraud, ITT made no effort to support its allegation. ITT did not call the patent examiner to obtain his opinion on the relevancy and materiality of these publications. There was no showing that he was unavailable and without such testimony, this court is left with, at best, only "inferences and speculations which are insufficient to constitute substantial evidence" in support of ITT's allegation of fraud. *See American Cyanamid Co.* v. *F. T. C.*, 363 F. 2d 757, 779 (6th Cir. 1966).

2. Technical Information

In further support of its allegation of fraud, ITT asserts that Raychem withheld from the patent examiner certain technical information obtained from tests performed by Raychem. Example 4 of the patent was designed to demonstrate the importance

of cross-linking the Kynar layer in order to pass the life cycle test of Mil-W-81044. Only those test results that related to this comparison of uncross-linked and cross-linked Kynar were included in the patent application. ITT contends that other test results listed in Exhibit 71 should have included in example 4 to allow an accurate evaluation of the patent. Since the purpose of the example was to demonstrate the beneficial effects to cross-linking, the other test results were irrelevant. Excluding those results was not improper and certainly does not demonstrate fraud.

3. Raychem's Disclosure of Other Aircraft Wire

ITT has asserted that Raychem withheld from the Patent Office information regarding other aircraft wire and that because of his lack of information regarding the existence and properties of such wire, the Patent Examiner erred in granting the patent. The insubstantiality of this assertion is made clear from a reading of the patent which discloses many prior art wires and their properties. In columns 3 and 4 of the patent the following wires are disclosed: (1) Silicone rubber with dacron-glass braid, Mil-W-8777; (2) Polytetrafluorethylene (Teflon) having an interior layer of mineral powder, MS18000, Mil-W-22759; (3) Polytetraflourethylene tape in combination with saturated glass braid, MS90294, Mil-W22759; (4) Polytetraflourethylene, Mil-W-16878 (Type E-TFE); (5) Polyvinylidene chloride, Mil-W-16878 (Type B-PVC); (6) Flourinated-ethylene propylene, Mil-W-16878 (Type K-FEP). Comparisons of these wires with 44 wire on the basis of weight, abrasion resistance, dynamic cut-through, and flammability were also included.

In short, ITT's contention that Raychem withheld relevant information from the Patent Office and procured the patent through fraud is without merit. The evidence admits only of one conclusion: that Raychem dealt with the Patent Office in candor and good faith.

V. Infringement

The issue of infringement was not seriously contested at trial. Since Raychem had granted a royalty-free license to the federal government, ITT's sales to the Government are not part of the infringement claim. ITT applied for a license from Raychem for commercial sales. When this was refused, ITT proceeded, nonetheless, to manufacture and sell an infringing wire in the commercial market.

The compositions of the polyethylene layer of ITT Surprenant's cross-linked Kynar jacketed cross-linked polyethylene wire are listed below.[4] The Kynar jacket consisted of the homopolymer of vinylidene flouride from the years 1964 through

[4] Following are the compositions of the polyethylene layer used in ITT's wire, as stipulated by counsel.

May 1964	40 parts high density polyethylene 90 parts low density polyethylene 2.25 parts Santonox R 1.37 parts Sartomer 350 (cross-linking agent)
April 1967	54 parts flame retardent polyethylene 54 parts branched polyethylene 1.35 parts titanium doxide 6.75 parts stabilizer 5.40 parts antioxidant 14.18 parts antimony oxide 2.5 parts Sartomer 350
March 1969	80 parts low density polyethylene 16 parts chlorinated polyethylene 5.5 parts antiox 10.5 parts antimony oxide 2.0 parts stabilizer 6.75 parts lead stabilizer 3.0 parts Sartomer 350 2.0 parts filler
August 1976	A blend of the formulation set forth immediately above and high density polyethylene

1968. From 1968 until the present, the Kynar layer consisted of the homopolymer of vinyldene fluoride and triallyl cyanurate or the copolymer of vinylidene fluoride and 5% tetrafluoroethylene (Kynar 5200) and triallyl cyanurate. Kynar 5200 comes within the definition of polyvinylidene flouride. ITT never told its customers that it was using Kynar 5200 instead of polyvinylidene fluoride homopolymer. It is used to achieve substantially the same result as the homopolymer. Both inner and outer layers have been cross-linked throughout to a dose of at least 2 megarads of irradiation.

Each of the constructions infringes claims 1, 4, 5, 8 and 9 of the patent in suits. In addition, since 1968, ITT has infringed claims 2 and 6 by its inclusion of triallyl cyanurate in the Kynar layer. Since April 1965, ITT infringed claim 3 by its inclusion of antimony oxide in the polyethylene layer of the infringing wire.

Conclusion

The court holds that U. S. Patent No. 3,269,862 is valid and that ITT's Surprenant division has infringed that patent. Decision on the award of attorney's fees is reserved and the case is ordered set down for a hearing on the issue of damages.

JOSEPH L. TAURO
United States District Judge